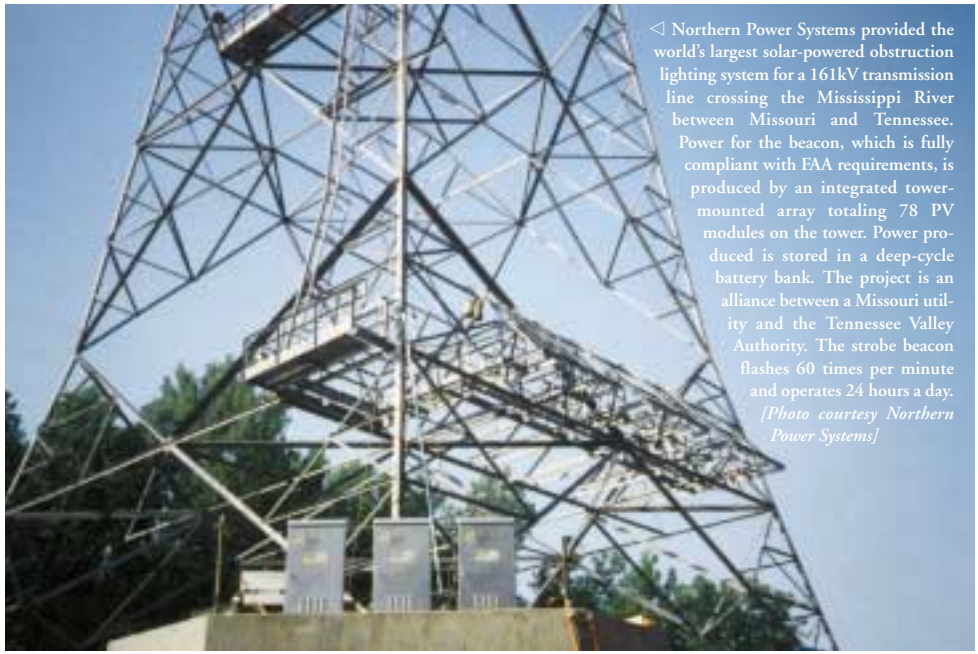
Along America's waterways, one of the earliest terrestrial uses of PV are navigational buoys and other aids to navigation. The loads required for these applications are typically small, the installations are remote, and the utility grid is not generally accessible, making PV a perfect match for this use.

Applications may range from lighthouse beacon power to a small single-module system posted on a lonely stretch of riverbank. But because these signals, sirens, and lights are all lifesaving measures, system reliability is paramount. PV provides that critical reliability.

The United States Coast Guard has converted all its navigational buoys from primary batteries to PV-powered rechargeable batteries, thus saving millions of dollars in battery replacement costs alone.

In fact, warning signs, signals and lights—typically navigational beacons—are one of the most popular applications for PV in the United States.



◁ Northern Power Systems provided the world's largest solar-powered obstruction lighting system for a 161kV transmission line crossing the Mississippi River between Missouri and Tennessee. Power for the beacon, which is fully compliant with FAA requirements, is produced by an integrated tower-mounted array totaling 78 PV modules on the tower. Power produced is stored in a deep-cycle battery bank. The project is an alliance between a Missouri utility and the Tennessee Valley Authority. The strobe beacon flashes 60 times per minute and operates 24 hours a day. *[Photo courtesy Northern Power Systems]*

◁ The U. S. Coast Guard has converted all its navigational buoys from primary batteries to PV-powered rechargeable batteries and is saving millions of dollars a year on the cost of servicing and maintaining them. This single-module system is typical of more than 14,000 sites that the U.S. Coast Guard has converted. The module is covered to protect against vandalism. *[Photo courtesy Sandia National Laboratories]*

▷ A 100W Solar Electric Power assembly operates a digital camera monitoring system, which scans a major waterway for marine traffic. The system operation and location are confidential, but this type of high security system is growing popular for many applications. Similar systems operate recording devices, power alarms, and power remote video surveillance systems, to name just a few security-type applications. *[Photo courtesy SEPCO™ – Solar Electric Power Company, Ltd.]*

◁ Photovoltaics powers the navigational light at the Bureau of Land Management's Turn Point Light Station, Stuart Island, San Juan Islands, Washington. *[Photo courtesy Sandia National Laboratories]*

◁ A 650 watt AstroPower array powers a flashing light in the Fenwick Island Lighthouse located on the Delaware-Maryland line. *[Photo courtesy Atlantic Solar Products]*

▽ A large pole-mounted stand alone power assembly illuminates 18 decorative fixtures and a lighthouse for the Kisimee (Florida) Parks and Recreation Department. At the end of the peninsula, the small-scale lighthouse flashes at the rate of a large-scale lighthouse with white LED lights. *[Photo courtesy Solar Electric Power Company, Ltd. – SEPCO]*

△ This small PV installation at the dock at Stuart Island, San Juan Islands, Washington, is sufficient to power an effluent dump station for boats that dock there. *[Photo courtesy Sandia National Laboratories]*

◁ Aids to navigation are some of the most popular uses for photovoltaics. Pictured here is a PV array for the Au Sable Light Station complex. The highest subarray, with the horizontal bar above it, is designed to always be above the snow level so that some solar power will be available throughout the winter. Snowfalls at the area have reached 70 inches. The horizontal bar is for protection from falling trees. The inset photo is the quaint lighthouse at Au Sable, Michigan, a registered historic site. The system was designed and installed by Currin Corporation, Midland, Michigan. *[Photos courtesy Currin Corporation and Sandia National Laboratories]*